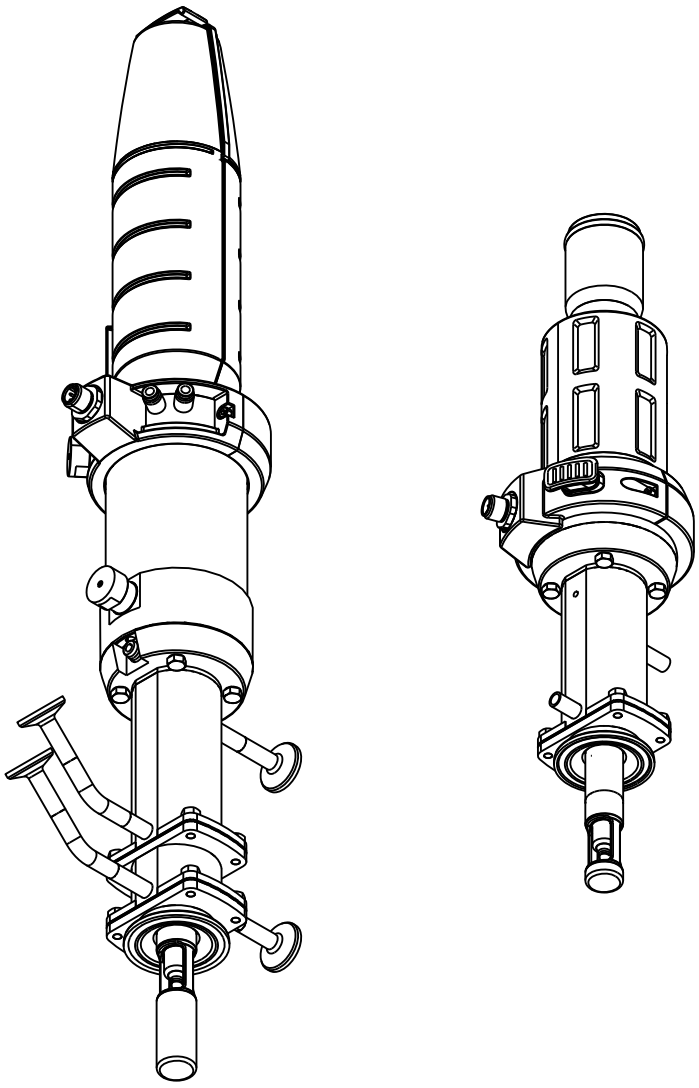
Operating Instructions
Cleanfit CPA875

Retractable process assembly for sterile and hygienic applications



Endress+Hauser
People for Process Automation

Document information

Safety information

The structure, signal words and color coding applied to safety information comply with the requirements of ANSI Z535.6 ("Product safety information in product manuals, instructions and other collateral materials").

Structure of information	Meaning
⚠ DANGER **Cause (/Consequences)** Possible consequences if ignored ▶ Preventive measures	This symbol alerts you to a dangerous situation. If you do not avoid this dangerous situation, it **will** result in death or serious injury.
⚠ WARNING **Cause (/Consequences)** Possible consequences if ignored ▶ Preventive measures	This symbol alerts you to a dangerous situation. If you do not avoid the dangerous situation, it **may** result in death or serious injury.
⚠ CAUTION **Cause (/Consequences)** Possible consequences if ignored ▶ Preventive measures	This symbol alerts you to a dangerous situation. If you do not avoid the dangerous situation, it may result in minor or more serious injuries.
NOTICE **Cause/situation** Possible consequences if ignored ▶ Action/note	This symbol alerts you to situations which may result in damage to property.

Symbols

ℹ	additional information, tip
✔	permitted or recommended
✘	forbidden or not recommended

Table of contents

1 Basic safety instructions

1.1 Personnel requirements

- Installation, commissioning, operation and maintenance of the measuring system may be carried out only by specially trained technical personnel.
- The technical personnel must be authorized by the plant operator to carry out the specified activities.
- The electrical connection may be performed only by an electrical technician.
- The technical personnel must have read and understood these Operating Instructions and must follow the instructions contained therein.
- Measuring point faults may be rectified only by authorized and specially trained personnel.

Repairs not described in the Operating Instructions provided may only be carried out directly by the manufacturer or by the service organization.

1.2 Designated use

The Cleanfit CPA875 retractable assembly, which can be manually or pneumatically operated, is designed for the installation of sensors in tanks and pipelines.
Its mechanical construction means that it can be operated in pressurized systems (see Technical data).

Use of the device for any purpose other than that described, poses a threat to the safety of people and of the entire measuring system and is therefore not permitted.
The manufacturer is not liable for damage resulting from improper or non-designated use.

1.3 Workplace safety

As the user, you are responsible for complying with the following safety conditions:
- Regulations for explosion protection (Ex devices only)
- Installation guidelines
- Local standards and regulations

1.4 Operational safety

- Before commissioning the entire measuring point, verify that all connections are correct. Ensure that electrical cables and hose connections are not damaged.
- Do not operate damaged products, and safeguard them to ensure that they are not operated inadvertently. Mark the damaged product as defective.
- If faults cannot be rectified, the products must be taken out of service and secured against unintentional commissioning.

1.5 Product safety

The product is designed to meet state-of-the-art safety requirements, has been tested and left the factory in a condition in which it is safe to operate.
The relevant regulations and European standards have been observed.

2 Incoming acceptance and product identification

2.1 Incoming acceptance

- Verify that the packaging is not damaged.
- Notify your supplier of any damage to the packaging. Keep the damaged packaging until the matter has been settled.
- Verify that the contents are not damaged.
- Notify your supplier of any damage to the delivery contents. Hold on to the damaged goods until the matter has been settled.
- Check the delivery for completeness. Check it against the delivery papers and your order.
- Pack the product for storage and transportation in such a way that it is protected against impact and moisture. The original packaging offers the best protection. Furthermore, the permitted ambient conditions must also be observed (see "Technical data").
- If you have any questions, please contact your supplier or your local sales center.

2.2 Product identification

2.2.1 Nameplate

You can find the following information on the nameplate:
- Manufacturer details
- Order code
- Extended order code
- Serial number
- Operating conditions
- Safety information symbols

Compare the order code on the nameplate with your order.

2.2.2 Product identification

The order code and serial number of your device can be found in the following locations:
- on the nameplate
- in the delivery papers

To establish your device version, enter the order code from the nameplate into the search field at the following address:
www.products.endress.com/order-ident

2.3 Scope of delivery

The scope of delivery comprises:
- Ordered version of the assembly
- Operating Instructions in English

If you have any questions, please contact your supplier or your local sales center.

3 Installation

3.1 Installation

3.1.1 Orientation

The assembly is designed for installation on vessels and pipes. Suitable process connections must be available for this.
The assembly is designed in such a way that there are no restrictions with regard to its orientation.

The sensor that is used can restrict the orientation.
The service chamber and front chamber can drain on their own with an installation position of between 0° and 15° to the horizontal.

3.1.2 Dimensions

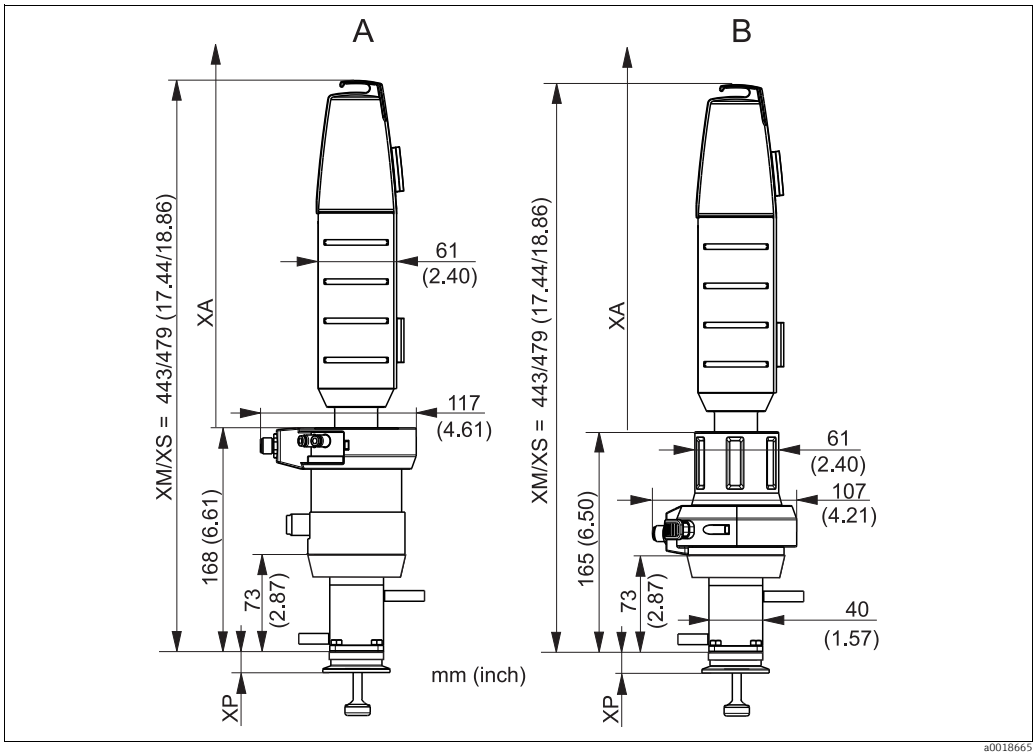
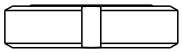
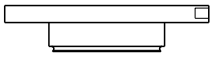
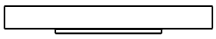
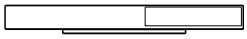
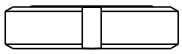
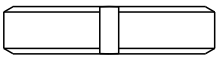


Fig. 1: Dimensions for short version (36 mm stroke)

A Pneumatic drive
B Manual drive
XM Assembly in measuring position
XS Assembly in service position
XP Height of particular process connection (see table below)
XA Necessary mounting distance for sensor replacement = 425 mm (16.73")

Process connection		Height XP in mm (inch)
CA Clamp ISO 2852, ASME BPE-2012, 1½"		14.9 (0.59)
CB Clamp ISO 2852, ASME BPE-2012, 2"		19.5 (0.77)

Process connection		Height XP in mm (inch)
CC Clamp ISO 2852, ASME BPE-2012, 2½"		13.0 (0.51)
DA Aseptic DN 25, clampable, DIN 11864-3 A		16.0 (0.63)
DC Aseptic DN 50 screw-in DIN 11864-1 A		16.0 (0.63)
DF Aseptic DN 50 grooved flange DIN 11864-2 A		14.2 (0.56)
EA Neumo BioControl D 65		25.0 (0.98)
EB Neumo BioConnect D 50		10.5 (0.41)
EF Neumo BioConnect D 65		10.5 (0.41)
MA Dairy coupling DN 50 DIN 11851		14.5 (0.57)
MB Dairy coupling DN 65 DIN 11851		13.8 (0.54)
VA Varivent flange N (DN 40 to 100)		19.0 (0.75)

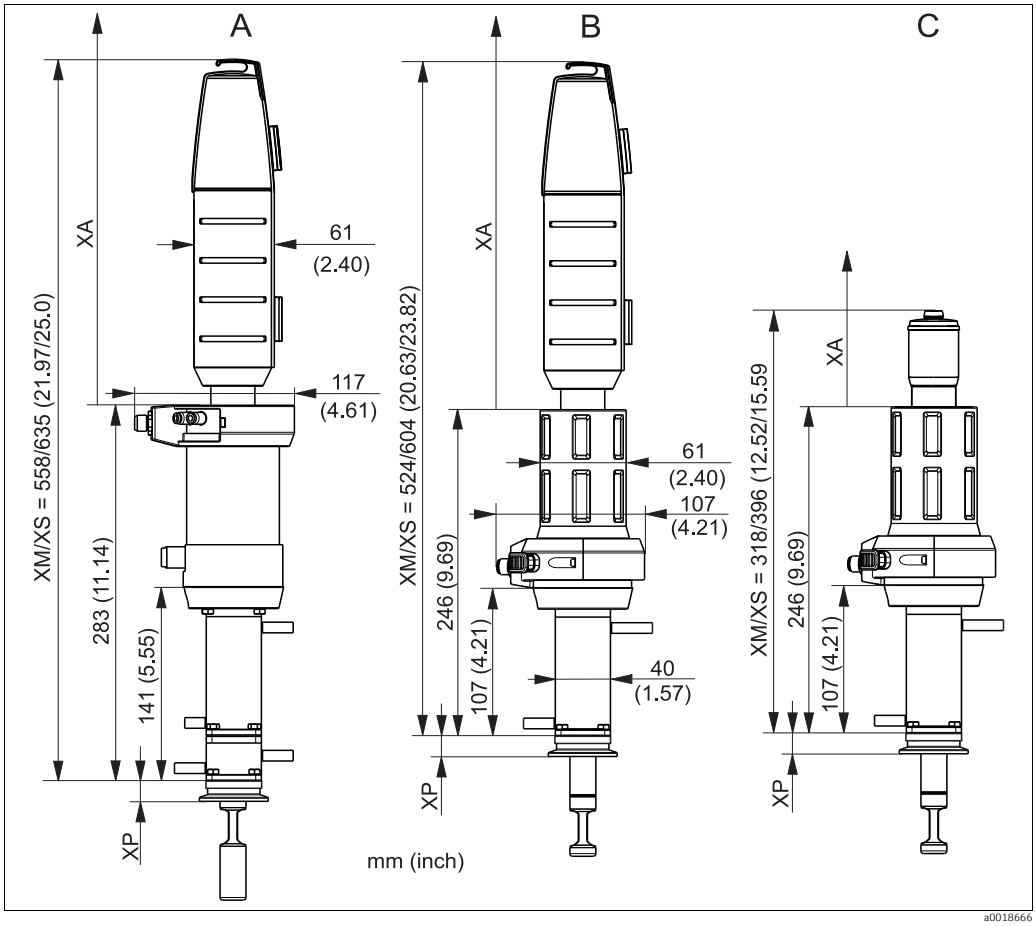


Fig. 2: Dimensions for long version (78 mm stroke)

A Pneumatic drive
B Manual drive
C Manual drive with small protection cap
XM Assembly in measuring position
XS Assembly in service position
XP Height of particular process connection (see table)
XA Necessary mounting distance for sensor replacement

The mounting distance XA is 440 mm (17.32") for 225 mm sensors
The mounting distance XA is 610 mm (24.02") for 360 mm sensors

3.1.3 Immersion depths

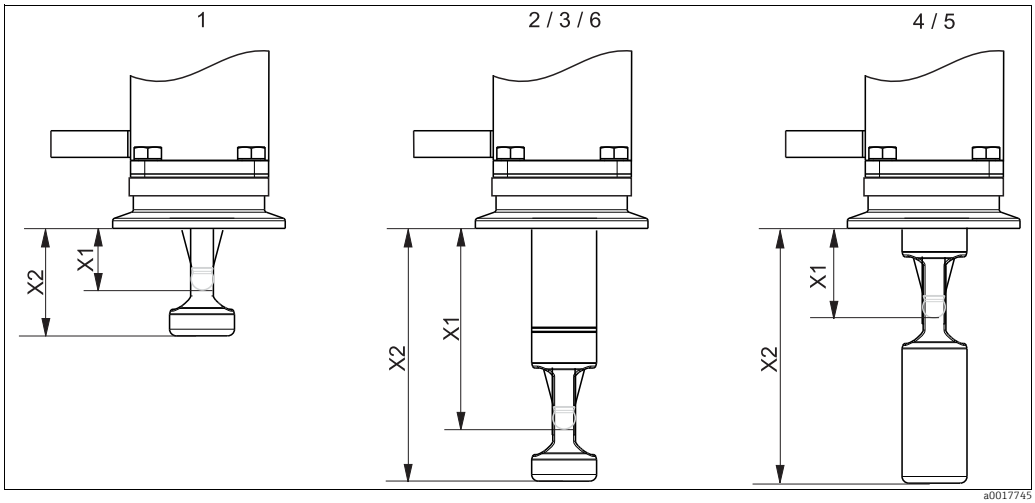


Fig. 3: Immersion depths for different service chambers

1 Single chamber / 36 mm stroke / sensor 225 mm incl. KCl
2 Single chamber / 78 mm stroke / sensor 225 mm excl. KCl
3 Single chamber / 78 mm stroke / sensor 360 mm incl. KCl
4 Double chamber / 78 mm stroke / sensor 225 mm incl. KCl / service position, inner chamber
5 Double chamber / 78 mm stroke / sensor 360 mm excl. KCl / service position, inner chamber
6 Double chamber / 78 mm stroke / sensor 360 mm excl. KCl / service position, front chamber

Immersion depths in mm (inch)

		Service chamber					
Process connection		**1**	**2**	**3**	**4**	**5**	**6**
CA Clamp ISO2852 ASME BPE-2012 1½"	X1 X2	20.6 (0.81) 31.6 (1.24)	62.1 (2.44) 73.1 (2.88)	62.1 (2.44) 73.1 (2.88)	28.1 (1.11) 73.1 (2.88)	28.1 (1.11) 73.1 (2.88)	62.1 (2.44) 73.1 (2.88)
CB Clamp ISO2852 ASME BPE-2012 2"	X1 X2	16.1 (0.63) 27.1 (1.07)	57.6 (2.27) 68.6 (2.70)	57.6 (2.27) 68.6 (2.70)	23.6 (0.93) 68.6 (2.70)	23.6 (0.93) 68.6 (2.70)	57.6 (2.27) 68.6 (2.70)
CC Clamp ISO2852 ASME BPE-2012 2½"	X1 X2	22.6 (0.89) 33.6 (1.32)	64.1 (2.52) 75.1 (2.96)	64.1 (2.52) 75.1 (2.96)	30.1 (1.19) 75.1 (2.96)	30.1 (1.19) 75.1 (2.96)	64.1 (2.52) 75.1 (2.96)
DA Aseptic DN 25 Clampable DIN11864-3 A	X1 X2	19.6 (0.77) 30.6 (1.20)	61.1 (2.41) 72.1 (2.84)	61.1 (2.41) 72.1 (2.84)	27.1 (1.07) 72.1 (2.84)	27.1 (1.07) 72.1 (2.84)	61.1 (2.41) 72.1 (2.84)
DC Aseptic DN 50 Screw-in DIN11864-1 A	X1 X2	27.1 (1.07) 38.1 (1.50)	68.6 (2.70) 79.6 (3.13)	68.6 (2.70) 79.6 (3.13)	34.6 (1.36) 79.6 (3.13)	34.6 (1.36) 79.6 (3.13)	68.6 (2.70) 79.6 (3.13)
DF Aseptic DN 50 Grooved flange DIN 11864-2 A	X1 X2	21.4 (0.84) 32.4 (1.28)	62.9 (2.48) 73.9 (2.91)	62.9 (2.48) 73.9 (2.91)	28.9 (1.14) 73.9 (2.91)	28.9 (1.14) 73.9 (2.91)	62.9 (2.48) 73.9 (2.91)
EA Neumo Biocontrol D 65	X1 X2	27.6 (1.09) 38.6 (1.52)	69.1 (2.72) 80.1 (3.15)	69.1 (2.72) 80.1 (3.15)	35.1 (1.38) 80.1 (3.15)	35.1 (1.38) 80.1 (3.15)	69.1 (2.72) 80.1 (3.15)
EB Neumo Bioconnect D 50	X1 X2	22.6 (0.89) 33.6 (1.32)	64.1 (2.52) 75.1 (2.96)	64.1 (2.52) 75.1 (2.96)	30.1 (1.19) 75.1 (2.96)	30.1 (1.19) 75.1 (2.96)	64.1 (2.52) 75.1 (2.96)
EF Neumo Bioconnect D 65	X1 X2	20.6 (0.81) 31.6 (1.24)	62.1 (2.44) 73.1 (2.88)	62.1 (2.44) 73.1 (2.88)	28.1 (1.11) 73.1 (2.88)	28.1 (1.11) 73.1 (2.88)	62.1 (2.44) 73.1 (2.88)
MA Dairy coupling DN 50 DIN11851	X1 X2	21.1 (0.83) 32.1 (1.26)	62.6 (2.46) 73.6 (2.90)	62.6 (2.46) 73.6 (2.90)	28.6 (1.13) 73.6 (2.90)	28.6 (1.13) 73.6 (2.90)	62.6 (2.46) 73.6 (2.90)
MB Dairy coupling DN 65 DIN11851	X1 X2	21.8 (0.86) 32.8 (1.29)	63.3 (2.49) 74.3 (2.93)	63.3 (2.49) 74.3 (2.93)	29.3 (1.16) 74.3 (2.93)	29.3 (1.16) 74.3 (2.93)	63.3 (2.49) 74.3 (2.93)
NA Thread ISO228 G 1¼	X1 X2		70.4 (2.77) 81.4 (3.20)	70.4 (2.77) 81.4 (3.20)			
VA Varivent flange N (DN 40 to DN 100)	X1 X2	16.6 (0.65) 27.6 (1.09)	58.1 (2.29) 69.1 (2.72)	58.1 (2.29) 69.1 (2.72)	24.1 (0.95) 69.1 (2.72)	24.1 (0.95) 69.1 (2.72)	58.1 (2.29) 69.1 (2.72)

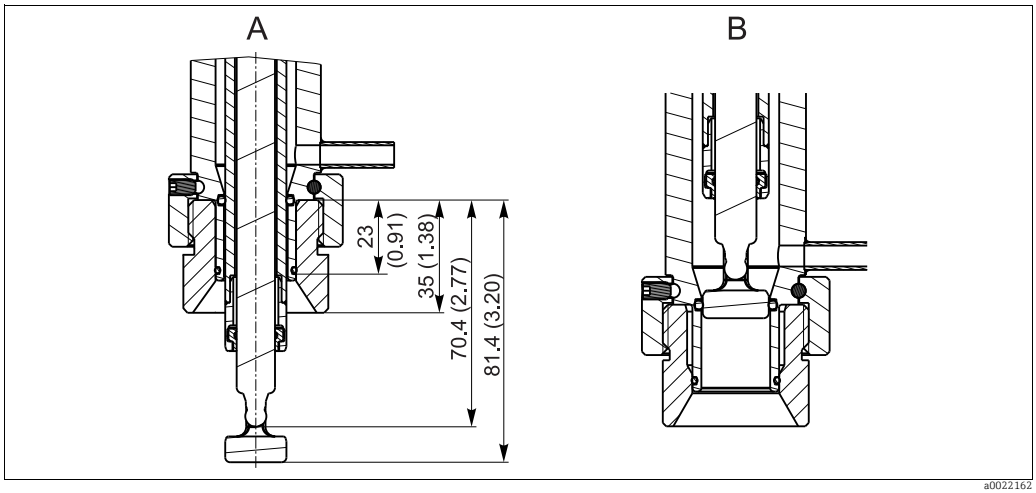


Fig. 4: Immersion depth in mm (inch) for process connection NA thread ISO228 G1¼ (service chamber 2 and 3)

A Measuring position
B Service position

3.2 Installation

3.2.1 Measuring system with single chamber

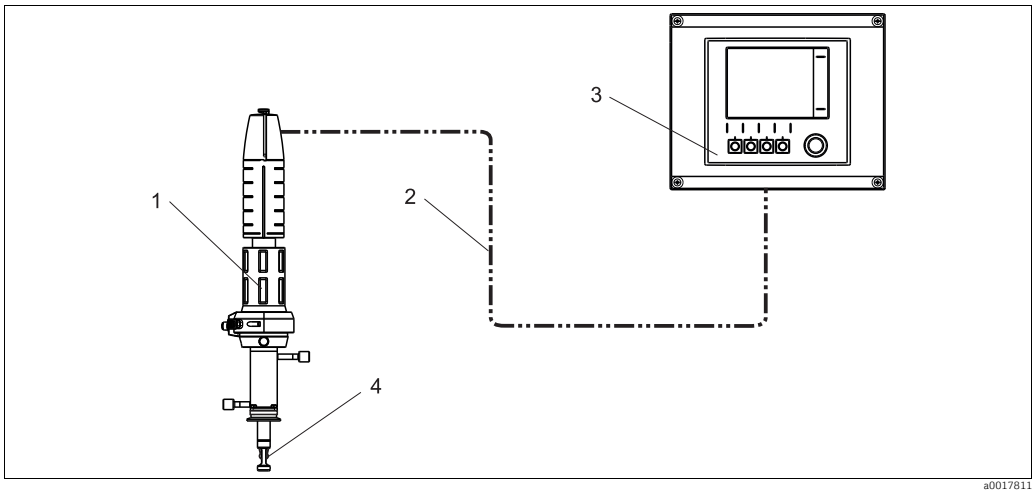


Fig. 5: Measuring system (example)

1 Cleanfit CPA875 assembly
2 Measuring cable
3 Liquiline CM44x transmitter
4 Sensor

3.2.2 Measuring system with double chamber

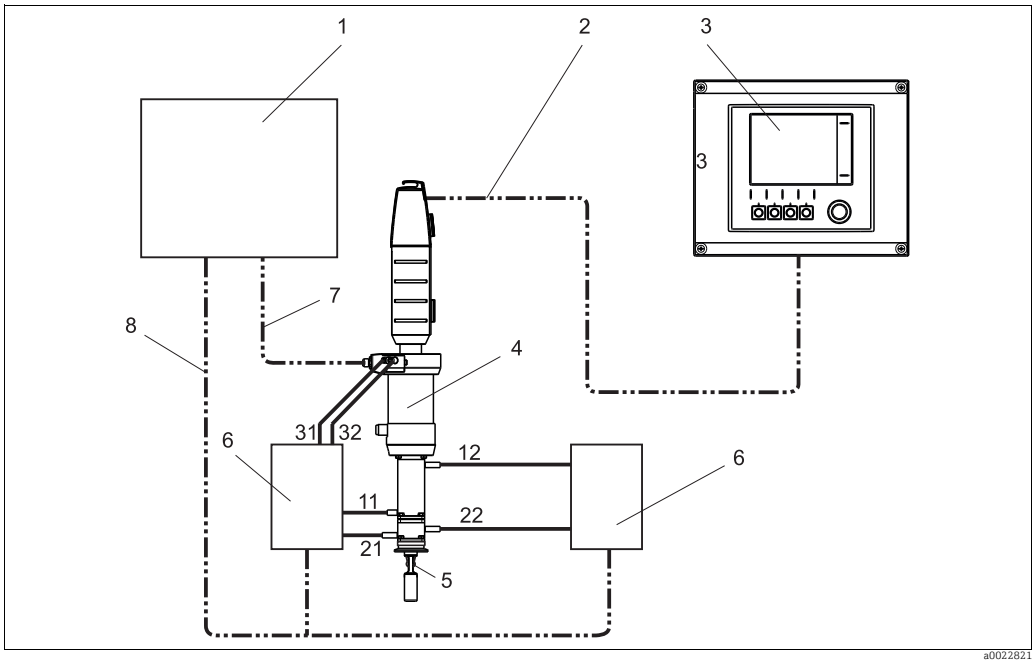


Fig. 6: Measuring system with pneumatic drive and double chamber (example)

1 Control unit
2 Measuring cable
3 Liquiline CM44x transmitter
4 Cleanfit CPA875 assembly
5 Sensor
6 Valve manifold
7 Limit position switch relay signal
8 Control signals (electric/pneumatic)
11/12 Inlet/outlet of inner service chamber
21/22 Inlet/outlet of front service chamber
31/32 Drive control

3.2.3 Installing the assembly in the process

⚠ WARNING

If process medium leaks out, there is a risk of injury due to high pressure, high temperature or chemicals.

- ▶ Wear protective gloves, goggles and clothing.
- ▶ Install the assembly only if the tanks and piping are empty and unpressurized.

Prior to installation, check the flange seal between the flanges.

1. Move the assembly to the service position (the triangle position marking is visible (→ 7).
2. Secure the assembly to the tank or piping using the process connection.
3. Follow the instructions in the next section to connect pipes for compressed air and rinse water (for the relevant assembly version).

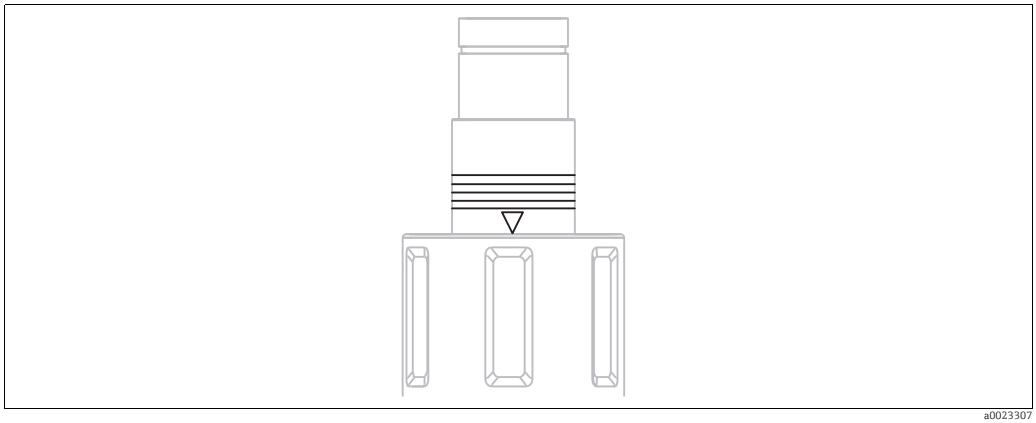


Fig. 7: Position markings (service position)

3.2.4 Pneumatic connection for automatic operation

Requirements:
- Air pressure of 4 to 7 bar (58 to 102 psi)
- Compressed air quality as per ISO 8573-1:2001
  Quality class 3.3.3 or 3.4.3 (see below)
- Solids class 3 (max. 5 µm, max. 5 mg/m^3, contamination with particles)
- Water content for temperatures ≥ 15 °C: class 4 pressure dew point 3 °C or lower
- Water content for temperatures 5 to 15 °C: class 3 pressure dew point -20 °C or lower
- Oil content: class 3 (max. 1 mg/m^3)
- Air temperature: 5 °C or higher
- No continuous air consumption
- Minimum nominal diameter of the air lines: 2 mm (0.08 ")

Connection: Threaded union M5, hose 4/2 mm AD/ID (adapter to 6/4 mm AD/ID enclosed)

Drive can be damaged if the air pressure is too high
There must be a pressure-reducing valve upstream if the air pressure can increase to above 7 bar (102 psi) (including any short pressure surges).

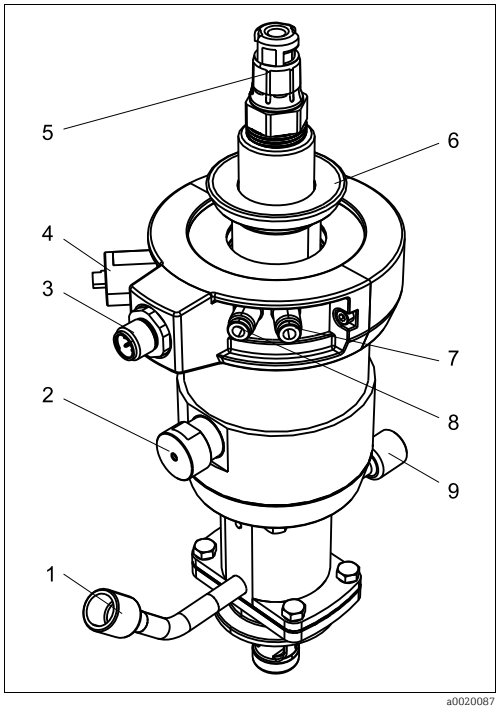


Fig. 8: Assembly with pneumatic drive (without protective cap)

1 Rinse connection
2 Automatic limit position lock, process
3 Connection for limit position switch
4 Automatic limit position lock, service
5 Sensor head:
6 Fastening ring for protective cap
7 Pneumatic connection (move to measuring position)
8 Pneumatic connection (move to service position)
9 Rinse connection

Use a pneumatic change-over valve (4/2-way valve) to move the assembly. Connect both inputs. If you connect only one input (e.g. for test purposes), the piston will be blocked, as the sensor guide moves before the limit position lock is deactivated.

3.2.5 Rinse connections

The connections of the service chamber of the sterile CPA875 retractable assembly make it possible to clean the chamber and the sensor with water or cleaning solution with a maximum pressure of 6 bar (87 psi) or to sterilize it with steam (SIP).
The retractable assembly can be selected with a single- or double-chamber system. If the double-chamber system is used, all four connections must be connected to inlet and outlet pipes.

Seals can be damaged if the water pressure is too high
Install an upstream pressure-reducing valve if the water pressure can increase to above 6 bar (87 psi) (including any short pressure surges).

3.2.6 Assignment of rinse connections for double chamber

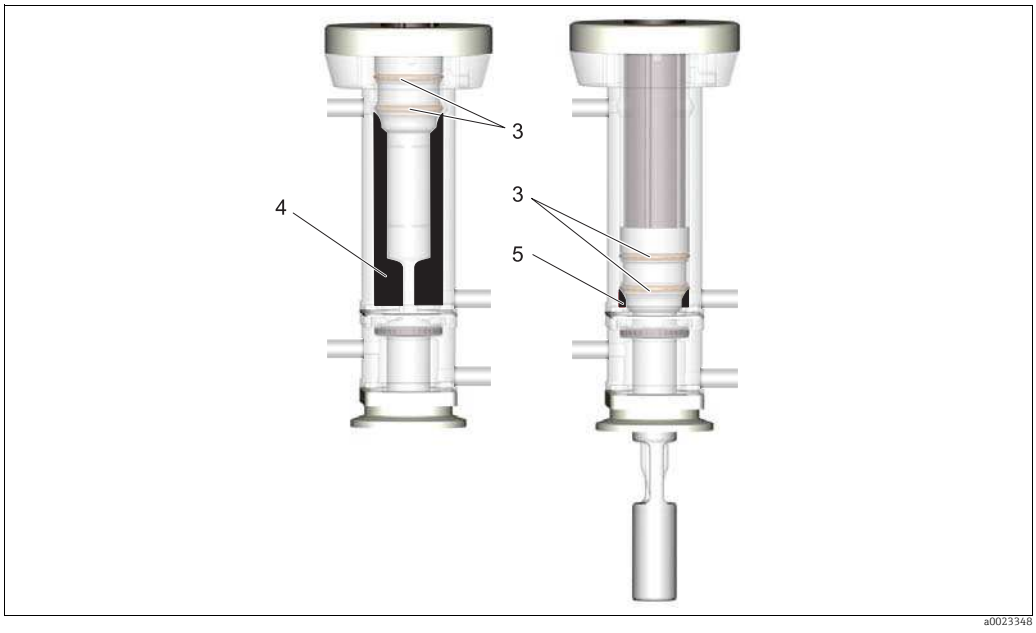


Fig. 9: Changing the chamber volume

3 "Moving" seals in the double chamber
4 Chamber volume in service position
5 Chamber volume in measuring position

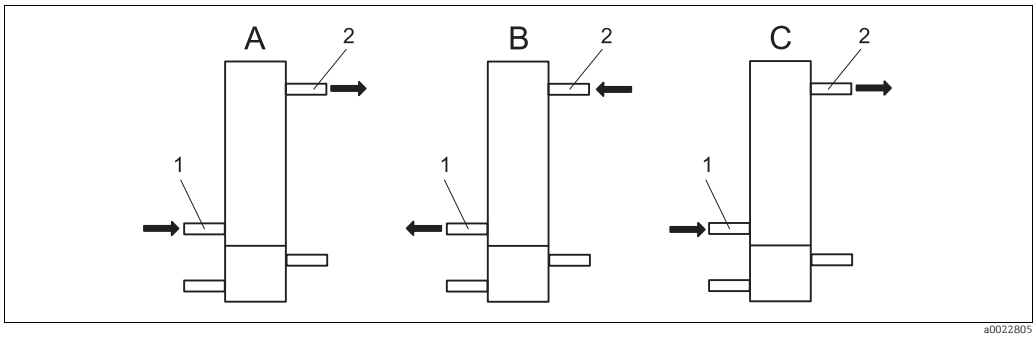


Fig. 10: Assignment of rinse inlet and outlet

A "Cleaning" state
B "Move from service position to measuring position" state
C "Move from measuring position to service position" state
1 Service chamber inlet
2 Service chamber outlet

In the "Cleaning" state (A), the inlet and outlet of the "inner" service chamber are used as follows (the internal volume of the "front" service chamber does not change, and so no pressure compensation measures are required here):
- Depending on the cleaning method, cleaning agent and purge gas are supplied via the inlet (1).
- These media are removed via the outlet (2).

In the "Move from service position to measuring position" state (B), the pressure conditions in the service chamber must be balanced when moving. The inlet and outlet of the service chamber are assigned as follows:
- The air is removed via the inlet (1) (inlet is open).
- The air is supplied via the outlet (2).

In the "Move from measuring position to service position" state (C), the pressure conditions in the service chamber must be balanced when moving. The inlet and outlet of the service chamber are assigned as follows:
- The air is supplied via the inlet (1).
- The air is removed via the outlet (2) (outlet is open).

The drive must be controlled simultaneously with the control of the inlets and outlets of the "inner service chamber".
The controller for the inlets, outlets and the drive is installed at the place of installation. It is not included in the delivery for the assembly.

3.2.7 Connecting the limit position switches

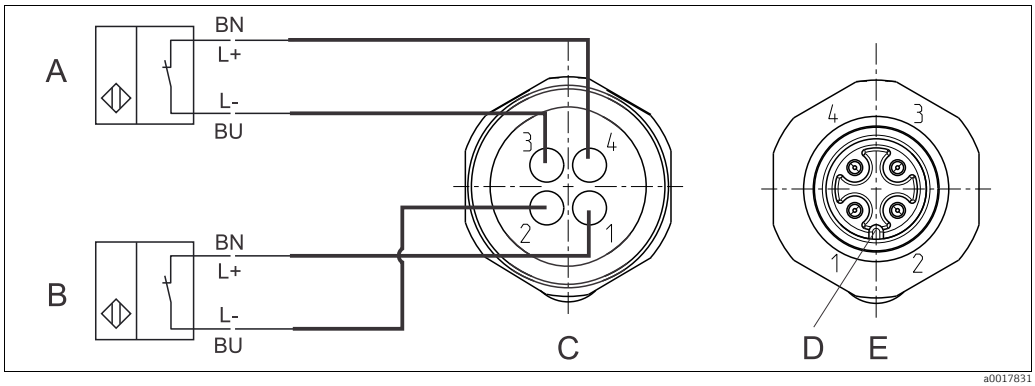


Fig. 11: Inductive limit position switches

A Limit position switch, Service position
B Limit position switch, Measure position
C Plug, M12, solder side
D Coding
E Plug, pin side

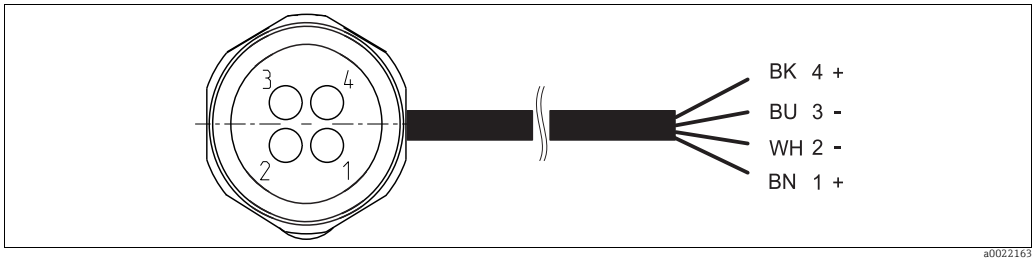


Fig. 12: Connecting cable for limit position switch

1 "Measuring" position
2 "Measuring" position
3 "Service" position
4 "Service" position

Only pins 1 and 2 are assigned for manually activated assemblies with one switch (measuring position).

Signal table for limit position switches

Position of assembly	Limit position switch for "measuring" position	Limit position switch for "service" position
Measuring	Active HIGH	Active HIGH
Service	Active LOW	Active LOW

3.3 Installing the sensor

⚠ WARNING

If process medium leaks out, there is a risk of injury due to high pressure, high temperature or chemicals.

- ▶ Wear protective gloves, goggles and clothing.
- ▶ Install the assembly only if the tanks and piping are empty and unpressurized.

3.3.1 Preparing the sensor and assembly

1. Remove the protective cap from the sensor.
   Ensure that the o-ring and thrust collar (→ 13, pos. 1) are present.
2. Immerse the sensor shaft in water. This makes for easier installation.
3. Move the assembly to the service position.

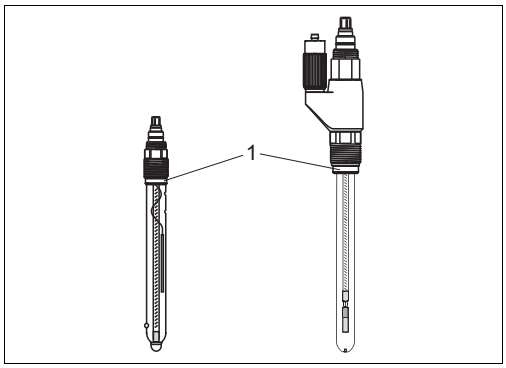


Fig. 13: Sensor installation

1 Thrust collar with o-ring

3.3.2 Installing and removing sensors

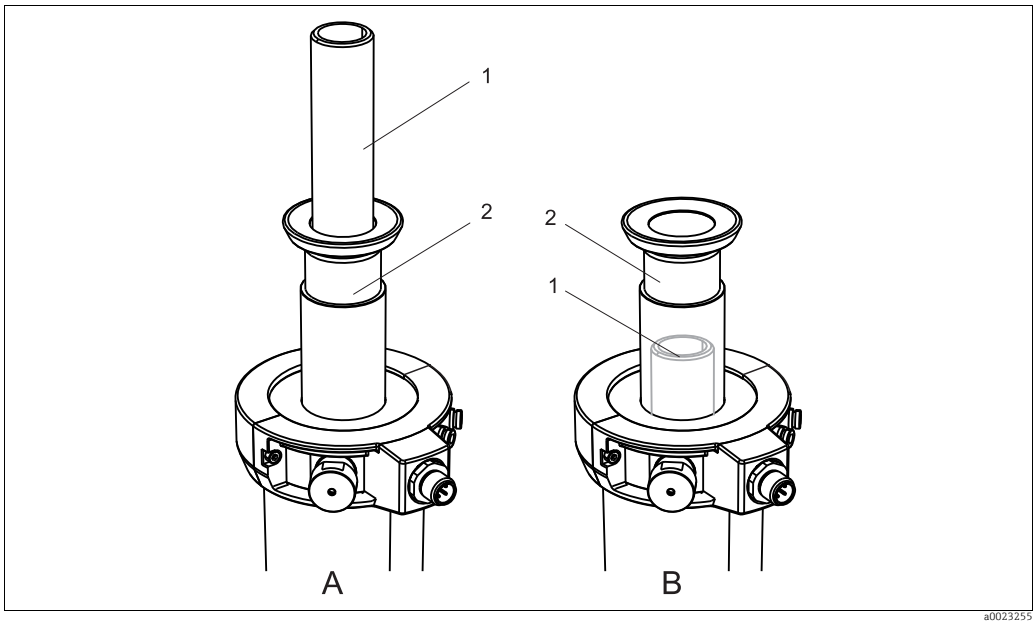


Fig. 14: Sensor installation options

1 Sensor adapter
2 Retraction pipe
A Sensor adapter is on top of the retraction pipe
B Sensor adapter is below the retraction pipe (not visible)

Depending on the assembly version, the sensor adapter is either visible (→ 14, pos. A) or installed inside the retraction pipe where it is not visible (pos. B). As a result, the procedures for installing and removing the sensors differ as follows:

Installing and removing sensors if the sensor adapter is visible (pos. A)

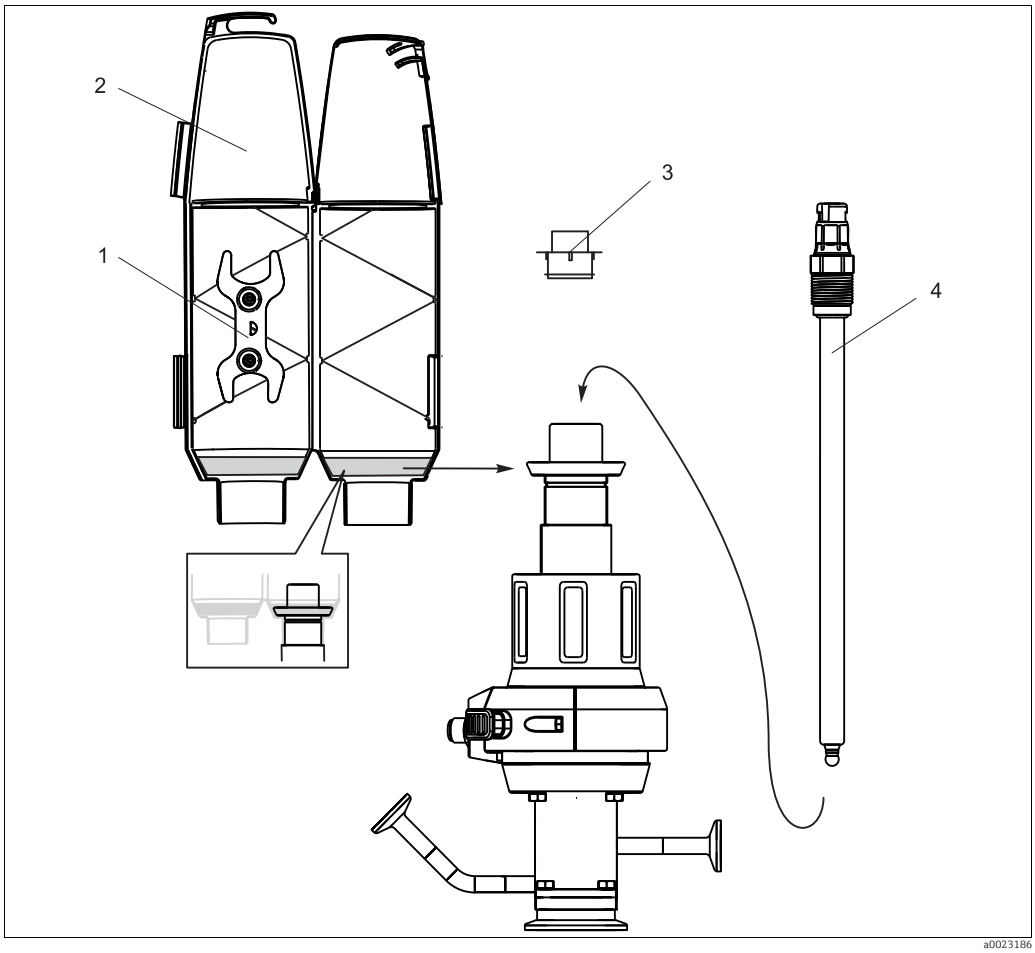


Fig. 15: Sensor installation

1 Open-ended wrench (AF 17/19 mm)
2 Protective cap
3 Dummy plug
4 Sensor

Gel and KCl sensors can be installed in this version.

Install the sensor as follows:

1. Remove the protective cap (→ 15, pos. 2) (this is possible only if the assembly is in the service position).
2. Remove the yellow dummy plug (pos. 3).
3. Screw in the sensor (pos. 4) in the place of the dummy plug:
   – hand-tighten initially
   – then tighten it by approx. ¼ turn using the open-ended wrench (pos. 1)
4. Attach the open-ended wrench back into the protective cap.
5. Put the protective cap on the assembly. When doing so, guide the measuring cable through the cable run (top of protective cap).

Always install the protective cap before moving the assembly to the measuring position. The protective cap cannot be removed in the measuring position. This prevents the sensor from being removed.

Installing and removing sensors if the sensor adapter is not visible (pos. B)

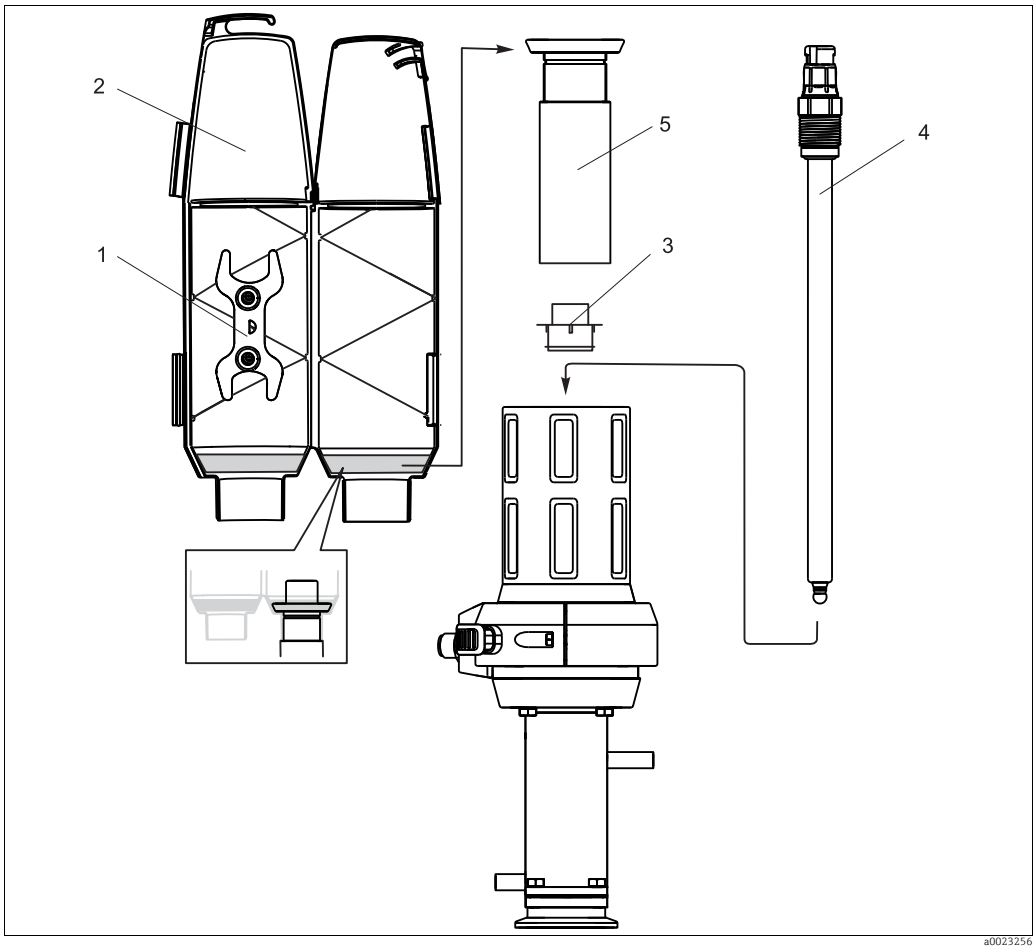


Fig. 16: Sensor installation

1 Open-ended wrench (AF 17/19 mm)
2 Protective cap
3 Dummy plug
4 Sensor
5 Retraction pipe

Gel sensors can be installed in this version. To install KCl sensors, you will need a "Gel - KCl adapter".

Install the sensor as follows:

1. Remove the protective cap (→ 16, pos. 2) (this is possible only if the assembly is in the service position).
2. Unscrew and remove the retraction pipe (pos. 5) (in an anticlockwise direction).
3. Remove the yellow dummy plug (pos. 3).
4. Screw in the sensor (pos. 4) in the place of the dummy plug:
   – hand-tighten initially
   – then tighten it by approx. ¼ turn using the open-ended wrench (pos. 1)
5. Guide the sensor cable through the retraction pipe and connect it to the sensor.
6. Screw the retraction pipe back in.
7. Attach the open-ended wrench back into the protective cap.
8. Put the protective cap on the assembly. When doing so, guide the measuring cable through the cable run (top of protective cap).

Always install the protective cap before moving the assembly to the measuring position. The protective cap cannot be removed in the measuring position. This prevents the sensor from being removed.

Installation of 360 mm gel and KCL sensors with "Gel - KCl adapter"

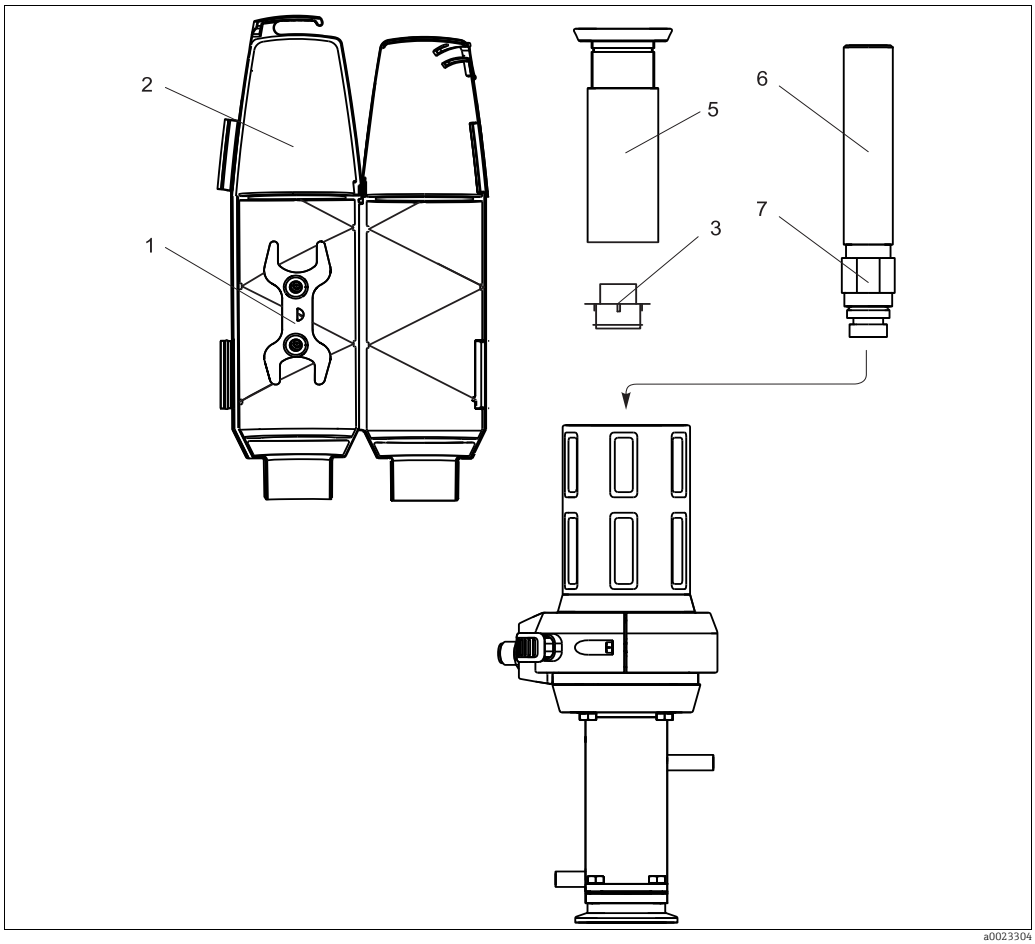


Fig. 17: Sensor installation, Part 1

1 Open-ended wrench (AF 17/19 mm)
2 Protective cap
3 Dummy plug
5 Retraction pipe
6 Adapter gel - KCl
7 Lock nut

Install the sensor as follows:

1. Remove the protective cap (→ 17, pos. 2) (this is possible only if the assembly is in the service position).
2. Unscrew the retraction pipe (pos. 5) (in an anticlockwise direction).
3. Turn the lock nut (pos. 7) on the "Gel - KCl adapter" (pos. 6) as far as it will go in an upward direction.
4. Remove the yellow dummy plug (pos. 3).
5. In the place of the dummy plug, screw in the "Gel - KCl adapter" (pos. 6) and hand-tighten.
6. Hand-tighten the lock nut (in a clockwise direction), and then use an open-ended wrench (AF 24 mm) to tighten it by ¼ turn.
7. Screw the retraction pipe back in.
8. Screw in the sensor (→ 18, pos. 4) (360 mm gel sensor or 360 mm KCl sensor):
   – hand-tighten initially
   – then tighten it by approx. ¼ turn using the open-ended wrench (pos. 1)
9. Attach the open-ended wrench back into the protective cap.
10. Put the protective cap on the assembly. When doing so, guide the measuring cable through the cable run (top of protective cap).

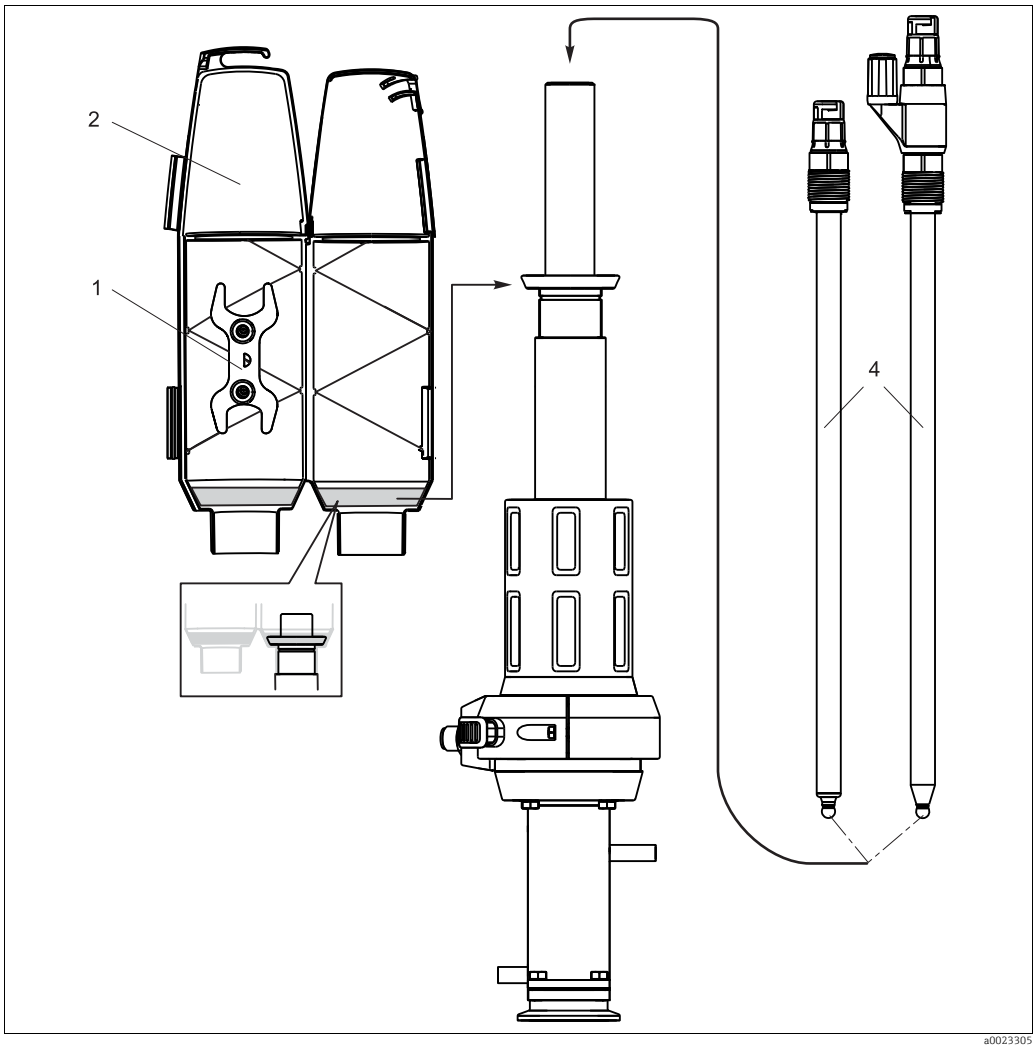


Fig. 18: Sensor installation, Part 2

1 Open-ended wrench
2 Protective cap
4 360 mm gel or KCl sensor

Always install the protective cap before moving the assembly to the measuring position. The protective cap cannot be removed in the measuring position. This prevents the sensor from being removed.

3.4 Post-installation check

- Following installation, check all the connections to ensure that they are properly secured and sealed.
- Ensure that the hoses for the rinse water connections cannot be removed without effort. These pipes are in open contact with the medium and must be secured accordingly.
- Check the hoses for damage.

4 Operating options

4.1 Initial commissioning

Prior to initial commissioning, ensure that:
- all seals are correctly seated (on the assembly and on the process connection)
- the sensor is correctly installed and connected
- the water connection at the rinse connections is correct (if present).

⚠ WARNING

If process medium leaks out, there is a risk of injury due to high pressure, high temperature or chemicals.

▶ Before subjecting the assembly to process pressure, verify that all connections are sealed!

Note that when moving the assembly, an open connection exists for a short period between the process and service chamber. This intermediate position can be used for what is known as "sealing water" or for the third stop position (see "Optional cleaning / sterilization of process seal")
Install the service chamber connections accordingly.

4.2 Operating elements

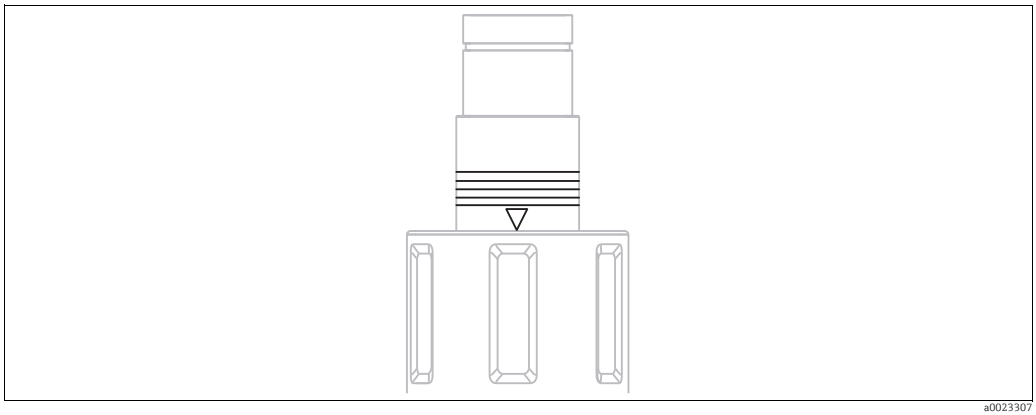
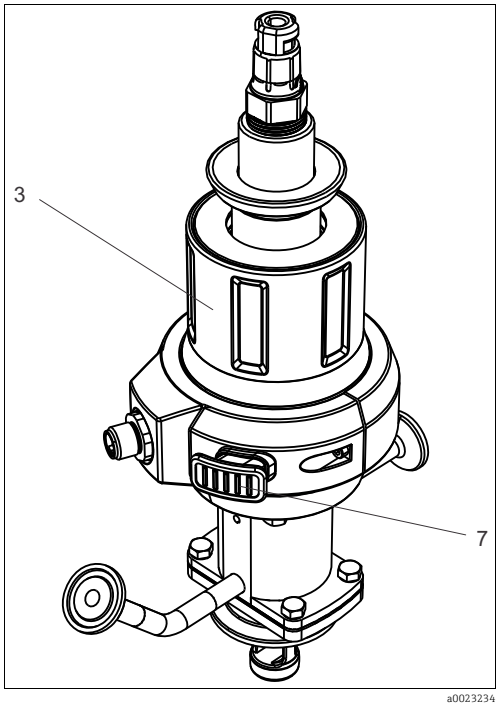


Fig. 19: Position markings (service position)

Assembly with pneumatic drive
The assembly with pneumatic drive does not have any operating elements.

Assembly with manual drive



3 Manual drive
7 Unlocking button

Fig. 20: Operating elements

4.3 Manual operation

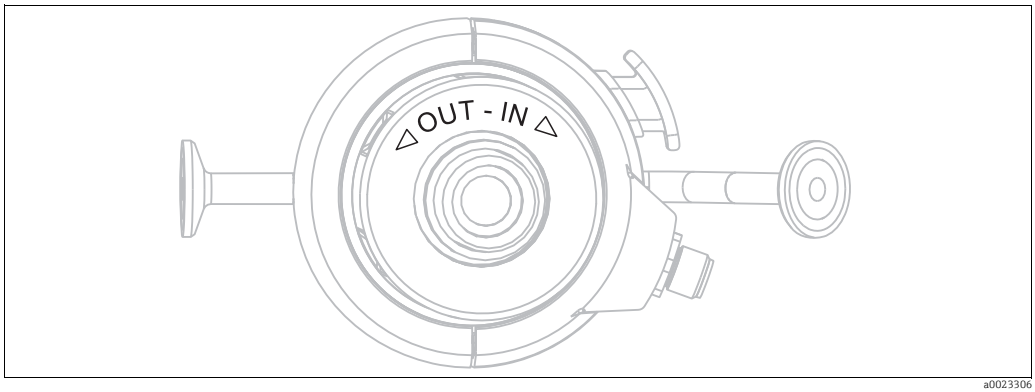


Fig. 21: Direction of rotation

Moving the assembly from the service position to the measuring position

1. Rotate the drive in a clockwise direction (→ 21), so that the sensor holder enters the process (this is possible only if a sensor is installed).
2. Rotate the drive until the lock engages.

Moving the assembly from the measuring position to the service position

1. Press the unlocking button.
2. Rotate the drive in an anti-clockwise direction (→ 21) as far as it will go (→ 19, service position).
3. Perform the required service activities.

4.4 Pneumatic operation

The assembly can be moved only if a sensor is installed.
The operation of the pneumatic version depends on the controller in question. The operating instructions can be found in the manual for the controller.

To move the assembly, use a pneumatic change-over valve (4/2-way valve). Connect both inputs. If you connect only one input (e.g. for test purposes), the piston will be blocked, as the sensor guide moves before the limit position lock is deactivated.

4.4.1 Moving the assembly if the compressed air supply fails

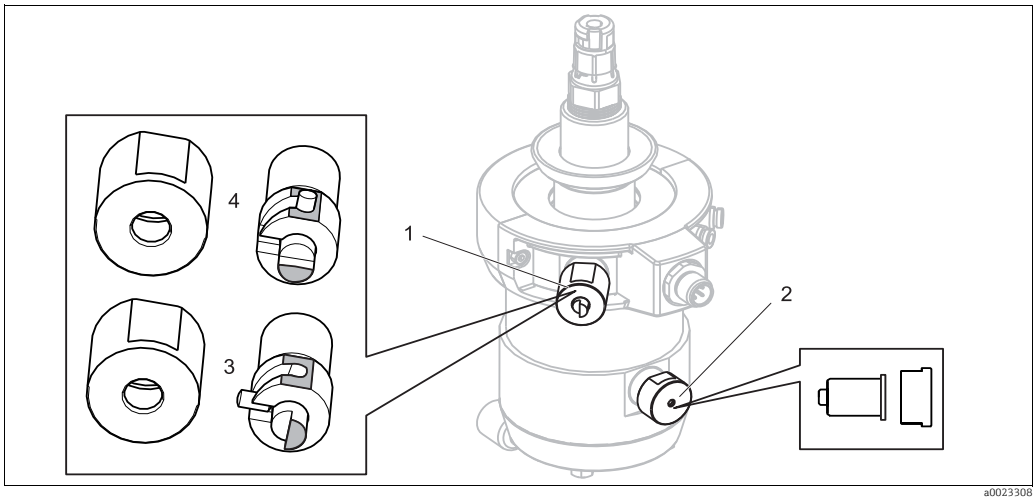


Fig. 22: Failure of compressed air supply

1 Limit position lock for service position
2 Limit position lock for measuring position
3 Normal position (flat side is on left)
4 Position for optional sterilization of seal (flat side is on top)

If the compressed air supply fails, you can still move the assembly manually. To do so, proceed as follows:

1. Unscrew both limit position locks (→ 22, pos. 1 and 2), and also remove the internal component. If the internal component is stuck (if an attempt was made to move the assembly without deactivating the limit position lock), move the assembly manually to the respective limit position.
2. Move the assembly to the desired position.
3. Screw the limit position lock back in. (Only in the case of optional sterilization of the process seal: Re-install the lock in the normal position (pos. 3)).

4.4.2 Optional cleaning/sterilization of process seal

With this version you can clean/sterilize the process seal (third rest position). To do so, proceed as follows:

1. Move the assembly to the service position.
2. Use the open-ended wrench to rotate the pin for the limit position lock (→ 22, pos. 1) from pos. 3 to pos. 4.
3. Move the assembly to the measuring position. The assembly now moves in the direction of the measuring position and remains in the "third rest position". When cleaning/ sterilizing the service chamber, the process seal is now also cleaned/sterilized.
4. Following cleaning/sterilization, move the assembly to the service position.
5. Use the open-ended wrench to rotate the pin for the limit position lock from pos. 4 to pos. 3.

You can now move the assembly to the measuring position and continue measuring.

5 Maintenance

⚠ WARNING

Risk of injury if medium escapes

- ▶ Before each maintenance activity, verify that the process piping, the tank and the service chamber are unpressurized, empty and have been rinsed.
- ▶ Move the assembly to the "service" position.

The assembly drive is maintenance-free. It is not possible to carry out maintenance or repair work on the drive.

5.1 Cleaning the assembly

To ensure stable and reliable measurements, the assembly and the sensor must be cleaned regularly. The regularity and intensity of the cleaning depend on the medium.

5.1.1 Manually operated assembly

All parts in contact with the medium, such as the sensor and the sensor guide, must be cleaned regularly. To do so, you must remove the sensor[1].

- Low levels of contamination are removed using suitable cleaning agents (see "Cleaning agent" section).
- High levels of contamination are removed using a soft brush and a suitable cleaning agent.
- For contamination that is difficult to remove, soak the parts in a cleaning solution. Then clean the parts using a brush.

A typical example of a cleaning interval would be 6 months in the case of drinking water.

5.1.2 Pneumatically controlled assembly

Regular, pneumatically controlled cleaning is possible using the rinse water connection and the right equipment e.g. the fully automatic cleaning and calibration system, Topcal S CPC310.

5.2 Cleaning the sensor

You must clean the sensor:

- before each calibration
- regularly during operation
- before returning it for repair

You can remove the sensor and clean it manually, or you can clean it in automatic mode[2] using the rinse water connection.

NOTICE

Incorrect measurement or damage to sensor due to incorrect cleaning

- ▶ The ORP electrodes must always be cleaned mechanically and using water. Do not use any chemical cleaning agents. These cleaning agents cause a potential to be imposed on the electrode which takes several hours to dissipate. This potential results in a measurement error.
- ▶ Do not use abrasive cleaning agents. These cleaning agents may cause irreparable damage to the sensor.
- ▶ After the sensor has been cleaned, rinse the assembly's rinse chamber using an ample quantity of water (possibly distilled or deionized). Otherwise, the residue from the cleaning agent may distort the measurement.
- ▶ If necessary, carry out a new calibration following cleaning.

1) same as sensor installation, but in reverse order
2) only if the assembly is fitted out accordingly

5.3 Cleaning agent

The choice of cleaning agent depends on the degree and type of contamination. The most common types of contamination and the appropriate cleaning agents can be found in the following table.

Type of contamination	Cleaning agent
Grease and oils	Hot water or tempered, surfactant-containing (alkaline) media[1)] or water-soluble organic solvents (e.g. ethanol)
Limescale, metal hydroxide coatings, sparingly soluble biofilms	approx. 3% hydrochloric acid
Sulfide deposits	Mixture of 3% hydrochloric acid and thiocarbamide (commercially available)
Protein-based coatings	Mixture of 3% hydrochloric acid and pepsin (commercially available)
Fibers, suspended solids	Pressurized water, possibly surfactants
Thin biofilms	Pressurized water

1) do not use with Tophit ISFET sensor! Instead use the usual commercially available acidic cleaning agents for the food industry (e.g. P3-horolith CIP, P3-horolith FL, P3-oxonia active).

⚠ CAUTION

Health hazard due to solvents

- Do not use any halogen-containing, organic solvents or acetone. These solvents may destroy plastic components of the sensor and are also suspected of causing cancer (e.g. chloroform).

5.4 Replacing seals

To replace the seals in the assembly, you must interrupt the process and remove the assembly completely.

⚠ CAUTION

Risk of injury due to residual medium and elevated temperatures

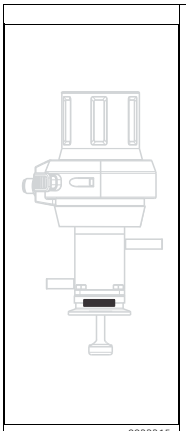
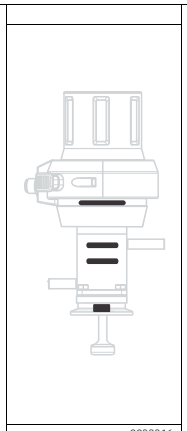
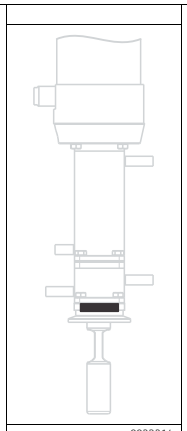
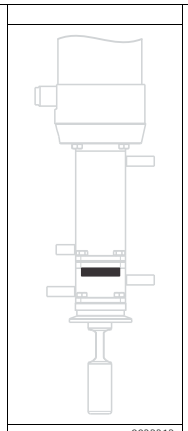
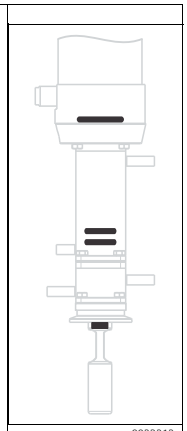
- When handling parts which are in contact with the medium, protect yourself from residual medium and elevated temperatures. Wear protective gloves and goggles.

Clean the assembly before replacing the seals (see "Cleaning the assembly" section).

Preparation

1. Interrupt the process. Pay attention to residual medium, residual pressure as well as elevated temperatures.
2. Move the assembly to the service position.
3. Completely detach the assembly from the process connection.
4. Clean the assembly (see "Cleaning the assembly" section).

The following sections describe how to replace the seals The following table serves as a guide to the relevant sections.

 a0023215	 a0023216	 a0023214	 a0023213	 a0023212
Molded seal - process connection (A)	O-rings - single chamber (B)	Molded seal - process connection, double chamber (C)	Molded seal - front chamber (D)	Seals - inner double chamber (E)

5.4.1 Molded seal - process connection (A)

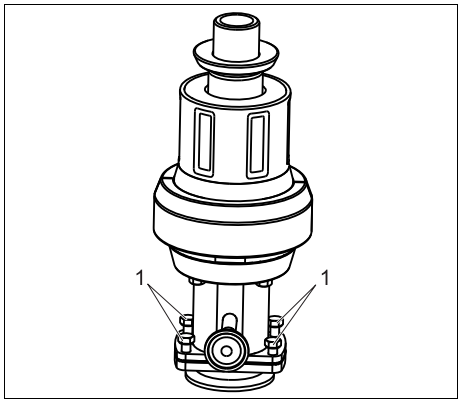


Fig. 23: Replacing seals, Part 1

1 Securing screws

1. Release the four securing screws (→ 23, pos. 1).

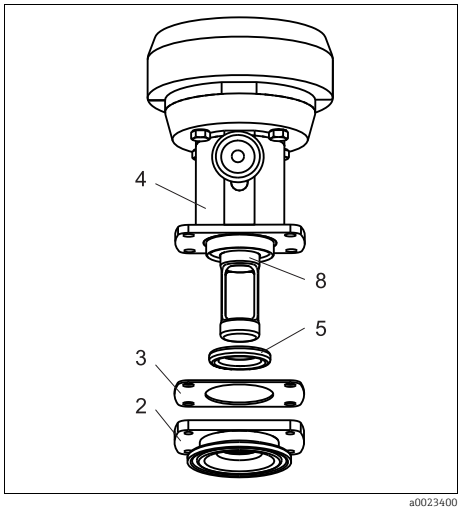


Fig. 24: Replacing seals, Part 2

2 Process connection
3 Gasket
4 Service chamber
5 Molded seal
8 Immersion tube

2. Remove the process connection (pos. 2).
3. Remove the molded seal (pos. 5) from the process connection
4. Apply a thin layer of grease to the new molded seal (e.g. Klüber Paraliq GTE 703).
5. Slide the molded seal over the immersion tube (pos. 8) and into the guide groove of the service chamber. Ensure that the molded seal is seated correctly.
6. Position the gasket (pos. 3) on the service chamber.
7. Place the process connection on the service chamber.
8. Tighten the four securing screws with a torque of 4 Nm.

5.4.2 O-rings - single chamber (B)

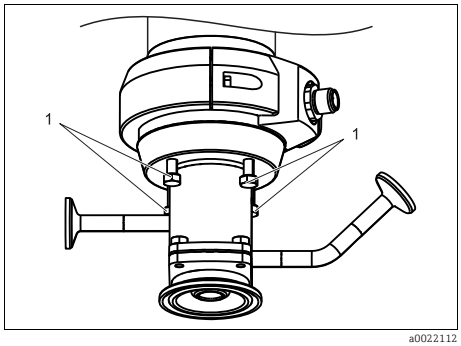


Fig. 25: Replacing seals, Part 1

1 Securing screws

1. Release the four securing screws (→ 25, pos. 1).
2. Remove the service chamber (pos. 3) together with the process connection (pos. 2).

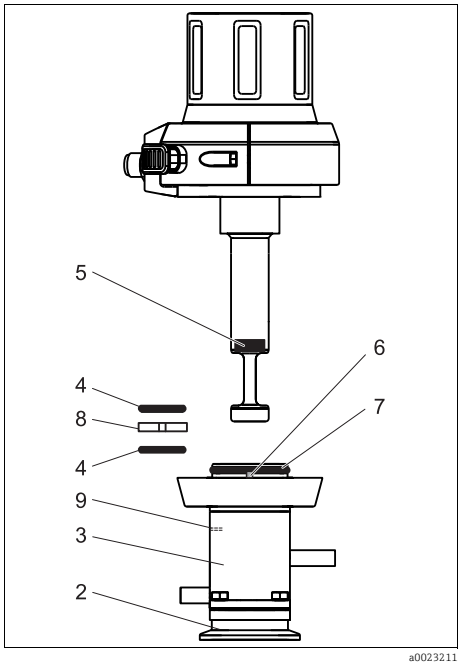


Fig. 26: Replacing seals, Part 2

2 Process connection
3 Service chamber
4 O-rings (inner service chamber)
5 Molded seal
6 Positioning pin
7 O-ring (top of service chamber) (pneumatic drive only)
8 Slide bush (pneumatic drive only)
9 Leakage detection

3. Use a tweezers to remove both o-rings (pos. 4) from the service chamber.
4. Pneumatic drive only: Push with a thin screw driver into the leakage detection (pos. 9). This way you push the slide bush (pos. 8) out of the guide slot. Now you can remove the slide bush with a tweezers.
5. Apply a thin layer of grease to the new o-rings and the slide bush (e.g. Klüber Paraliq GTE 703).
6. Pneumatic drive only: Insert the slide bush into the middle guide slot.
7. Insert both o-rings into the appropriate guide grooves in the service chamber.
8. Remove the molded seal (pos. 5) using a tweezers or long-nose pliers.
9. Apply a thin layer of grease to the molded seal and press the molded seal into the guide groove of the immersion tube. Ensure that the molded seal is seated correctly.
   If you insert a dummy sensor or circular rod (Ø 12 mm) until it protrudes just above the seal, the molded seal cannot move upwards while it is being inserted.
10. Pneumatic drive only: Remove the o-ring (pos. 7). Apply a thin layer of grease to the new o-ring, and position the o-ring in the guide groove.
11. Mount the service chamber together with the process connection onto the assembly.
    Pay attention to the positioning pin (pos. 6)
12. Tighten the four securing screws with a torque of 4 Nm.

5.4.3 Molded seal - process connection, double chamber (C)

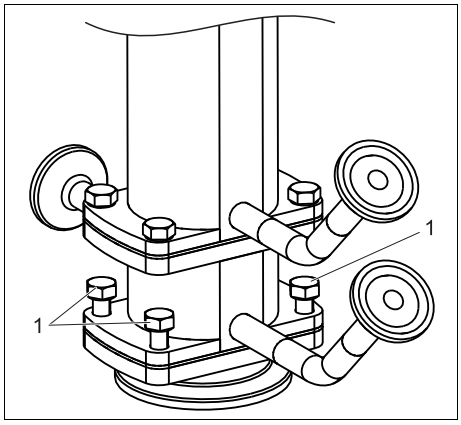


Fig. 27: Replacing seals, Part 1

1 Securing screws

1. Release the four securing screws (→ 27, pos. 1).

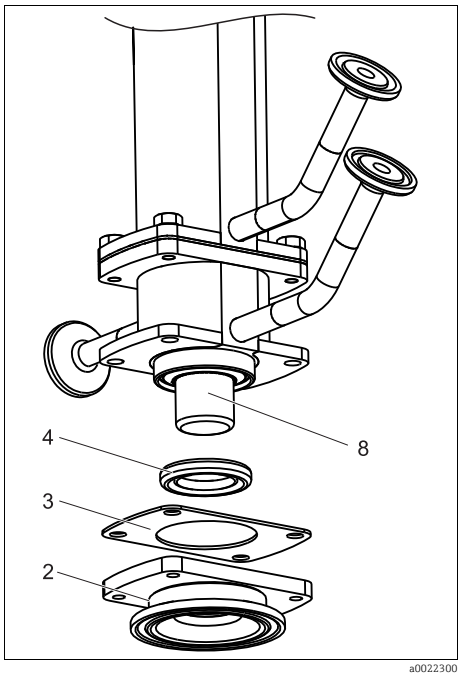


Fig. 28: Replacing seals, Part 2

2 Process connection
3 Gasket
4 Molded seal
8 Immersion tube

2. Remove the process connection (pos. 2).
3. Remove the molded seal (pos. 4) from the process connection
4. Apply a thin layer of grease to the new molded seal (e.g. Klüber Paraliq GTE 703).
5. Slide the molded seal over the immersion tube (pos. 8) and into the guide groove of the service chamber. Ensure that the molded seal is seated correctly.
6. Position the gasket (pos. 3) on the rinse chamber.
7. Place the process connection on the service chamber.
8. Tighten the four securing screws with a torque of 4 Nm.

5.4.4 Molded seal - front chamber (D)

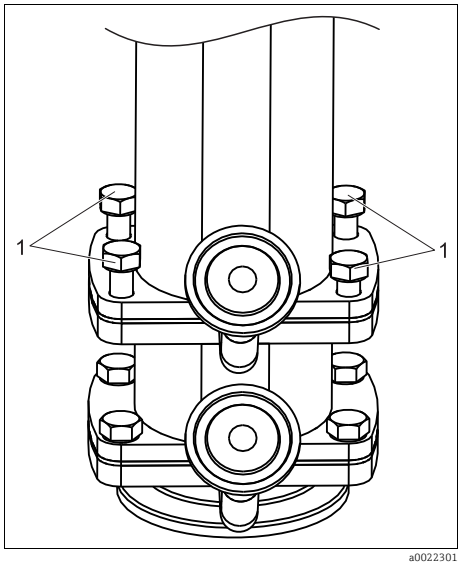


Fig. 29: Replacing seals, Part 1

1 Securing screws

1. Release the four securing screws (→ 29, pos. 1).

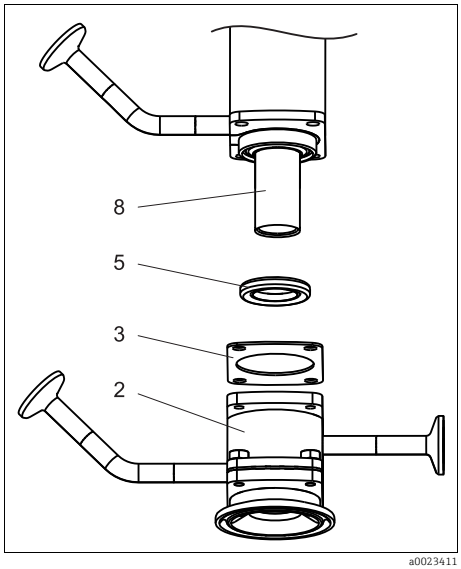


Fig. 30: Replacing seals, Part 2

2 Front chamber with process connection
3 Gasket
5 Molded seal
8 Immersion tube

2. Remove the front chamber together with the process connection (pos. 2).
3. Remove the molded seal (pos. 5) from the front chamber.
4. Apply a thin layer of grease to the new molded seal (e.g. Klüber Paraliq GTE 703).
5. Slide the molded seal over the immersion tube (pos. 8) and into the guide groove of the service chamber. Ensure that the molded seal is seated correctly.
6. Position the gasket (pos. 3) on the front chamber.
7. Place the front chamber together with the process connection on the service chamber.
8. Tighten the four securing screws with a torque of 4 Nm.

5.4.5 Seals - inner double chamber (E)

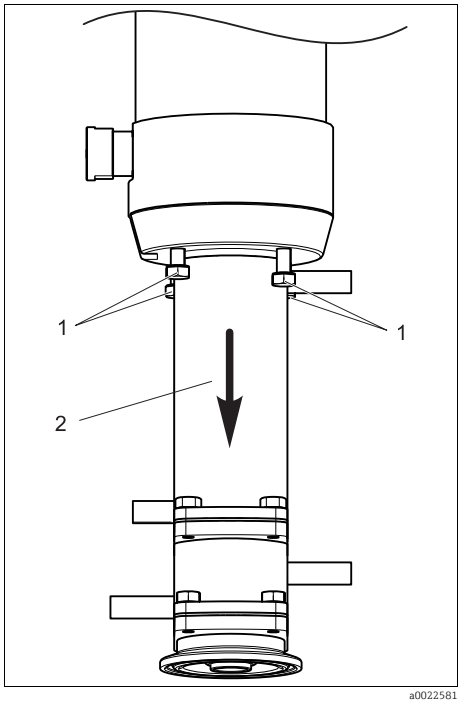


Fig. 31: Replacing seals, Part 1

1 Securing screws
2 Service chamber with front chamber and process connection

1. Release the four securing screws (→ 31, pos. 1).
2. Remove the service chamber with front chamber and process connection (pos. 2).

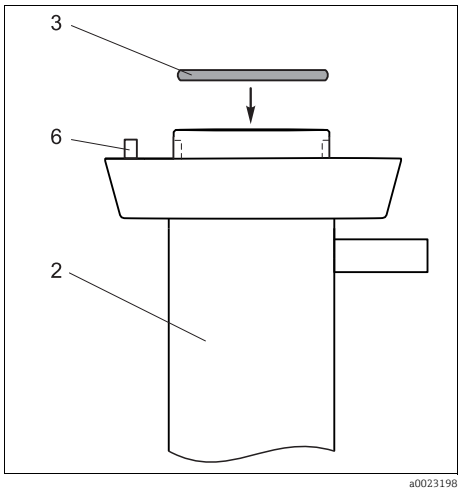


Fig. 32: Replacing seals, Part 2

2 Service chamber with front chamber and process connection
3 O-ring
6 Positioning pin

3. Remove the o-ring (→ 32, pos. 3)
4. Apply a thin layer of grease to the new o-ring (e.g Klüber Paraliq GTE 703) and position the o-ring in the groove.

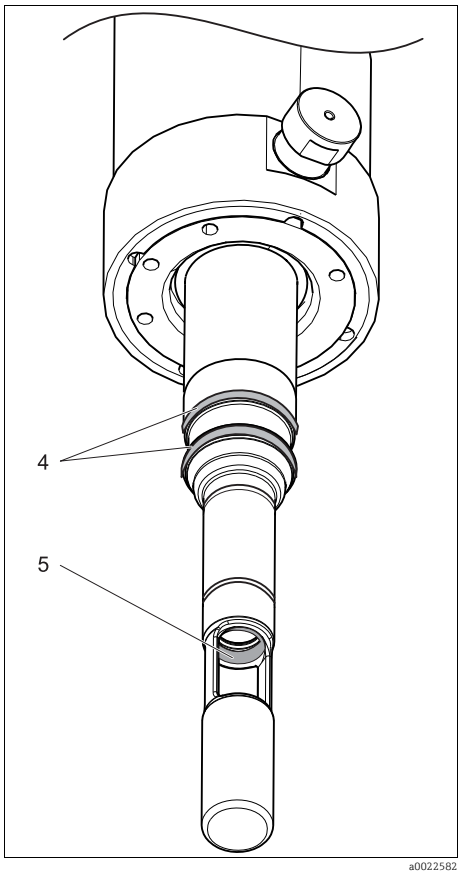


Fig. 33: Replacing seals, Part 3

4 O-rings
5 Molded seal

5. Remove the molded seal (→ 33, pos. 5) using a tweezers or long-nose pliers.
6. Apply a thin layer of grease to the new molded seal (e.g. Klüber Paraliq GTE 703).
7. Press the molded seal into the guide groove of the immersion tube. Ensure that the molded seal is seated correctly.
   If you insert a dummy sensor or circular rod (Ø 12 mm) until it protrudes just above the seal, the molded seal cannot move upwards while it is being inserted.
8. Remove both o-rings (pos. 4).
9. Apply a thin layer of grease to the new o-rings, and position the o-rings in both grooves.
10. Place the service chamber with front chamber and process connection on the assembly (pay attention to the positioning pin (→ 32, pos. 6).
11. Tighten the four securing screws with a torque of 4 Nm.

6 Repair

6.1 Replacing damaged components

⚠ WARNING

Danger resulting from improper repair

- Damage to the assembly, which compromises pressure safety, must be repaired **only** by authorized and qualified personnel.
- Damage to the drive can be repaired only at the place of manufacture. Repairs cannot be carried out onsite.
- Following each repair and maintenance task, the assembly must be checked for leaks using appropriate procedures. Following this, the assembly must again comply with the specifications in the technical data.

Replace all other damaged components immediately.

6.2 Spare parts kits

Detailed information on spare parts kits can be obtained using the "Spare Part Finding Tool" on the internet: www.products.endress.com/spareparts_consumables

6.3 Return

The product must be returned if it is in need of repair or a factory calibration, or if the wrong product was ordered or delivered. Legal specifications require Endress+Hauser, as an ISO-certified company, to follow certain procedures when handling all returned products that have been in contact with the medium.

To ensure that your device is returned swiftly, safely and in an appropriate manner, please read the procedures and conditions on the Endress+Hauser website at www.services.endress.com/return-material

6.4 Disposal

All assembly components must be disposed of separately, based on the material they are made of.
Please observe local regulations.

7 Accessories

The most important accessories available at the time this document went to print are listed below. Please contact your sales center for accessories that are not listed here.

The following accessories can be ordered via the product structure (see ordering information):

- Weld-in adapter G1¼, straight, 35 mm, 1.4435 (AISI 316 L), safety nozzle
- Weld-in adapter G1¼, angled, 35 mm, 1.4435 (AISI 316 L), safety nozzle

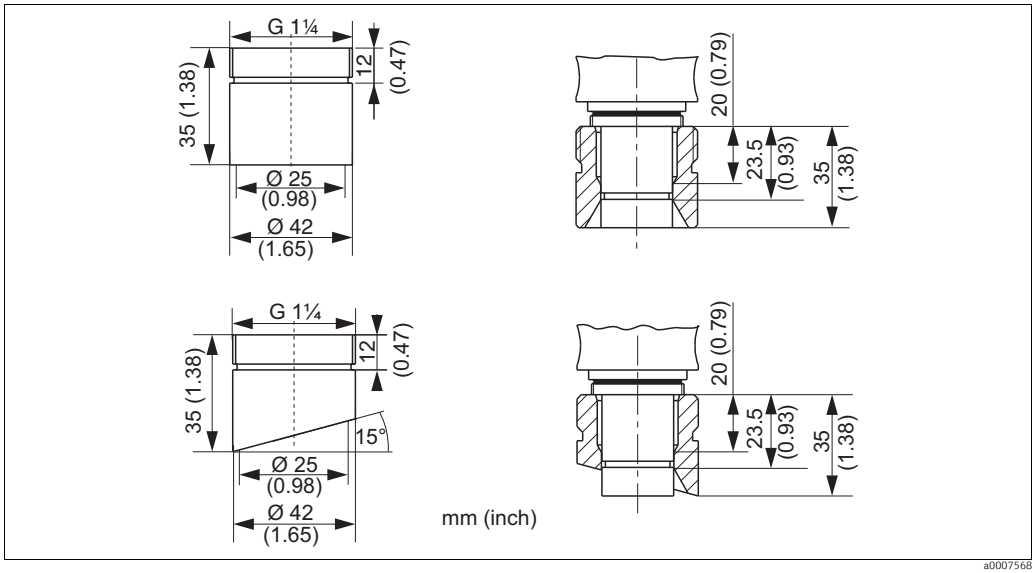


Fig. 34: Welding neck (safety nozzle)

- Dummy plug G1¼, 1.4435 (AISI 316 L), FPM - FDA
- Sensor dummy 225 mm, 1.4435 (AISI 316 L), Ra = 0.38 µm
- Sensor dummy 360 mm, 1.4435 (AISI 316 L), Ra = 0.38 µm
- Kit, EPDM FDA seals only for process connection G1¼, wetted parts, single chamber
- Kit, FKM FDA seals only for process connection G1¼, wetted parts, single chamber
- Kit, FFKM FDA seals only for process connection G1¼, wetted parts, single chamber
- Kit, EPDM FDA seals, wetted parts, single chamber, **not** for process connection G1¼
- Kit, FKM FDA seals, wetted parts, single chamber, **not** for process connection G1¼
- Kit, FFKM FDA seals, wetted parts, single chamber, **not** for process connection G1¼
- Kit, EPDM FDA seals, wetted parts, double chamber, all process connections
- Kit, FKM FDA seals, wetted parts, double chamber, all process connections
- Kit, FFKM FDA seals, wetted parts, double chamber, all process connections
- Kit, seals not in contact with the medium
- Cable, plug-in, limit switch, M12, 5 m
- Cable, plug-in, limit switch, M12, 10 m
- Tool in case for installation/removal

7.1 Installation material for rinse connections

Filter set CPC310, CVC400
- Water filter (dirt trap) 100 µm, complete, incl. angle bracket
- Order No. 71031661

Pressure reducer kit
- Complete, incl. manometer and angle bracket
- Order No. 51505755

Hose connection nipples for rinse connections G ¼, DN 12
- Stainless steel 1.4404 (AISI 316 L) (2 units);
- Order No. 51502808

Hose connection nipples for rinse connections G ¼, DN 12
- PVDF, 2 pieces;
- Order No. 50090491

7.2 Sensors

7.2.1 Glass electrodes

Orbisint CPS11/CPS11D
- pH electrode for process engineering
- Optional SIL version for connection to SIL transmitter
- With dirt-repellent PTFE diaphragm
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps11 or www.products.endress.com/cps11d)
- Technical Information TI00028C/07/EN

Orbisint CPS12/CPS12D
- ORP electrode for process engineering
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps12 or www.products.endress.com/cps12d)
- With dirt-repellent PTFE diaphragm
- Technical Information TI00367C/07/EN

Memosens CPS16D
- pH-ORP combination sensor for process engineering, with dirt-repellent PTFE diaphragm
- With Memosens technology
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps16d)
- Technical Information TI00503C/07/EN

Ceraliquid CPS41/CPS41D
- pH electrode with ceramics diaphragm and liquid KCl electrolyte,
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps41 or www.products.endress.com/cps41d)
- Technical Information TI00079C/07/EN

Ceraliquid CPS42/CPS42D
- ORP electrode with ceramics diaphragm and liquid KCl electrolyte,
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps42 or www.products.endress.com/cps42d)
- Technical Information TI00373C/07/EN

Ceragel CPS71/CPS71D
- pH electrode with double chamber reference system and integrated bridge electrolyte,
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps71 or www.products.endress.com/cps71d)
- Technical Information TI00245C/07/EN

Ceragel CPS72/CPS72D
- ORP electrode with double chamber reference system and integrated bridge electrolyte,
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps72 or www.products.endress.com/cps72d)
- Technical Information TI00374C/07/EN

Memosens CPS76D
- pH-ORP combination sensor for process engineering, hygiene and sterile applications
- With Memosens technology
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps76d)
- Technical Information TI00506C/07/EN

Orbipore CPS91/CPS91D
- pH electrode with open aperture diaphragm for media with high dirt load,
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps91 or www.products.endress.com/cps91d)
- Technical Information TI00375C/07/EN

Orbipore CPS92/CPS92D
- ORP electrode with open aperture diaphragm for media with high dirt load,
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps92 or www.products.endress.com/cps92d)
- Technical Information TI00435C/07/EN

Memosens CPS96D
- pH-ORP combination sensor for chemical processes
- With poison-resistant reference with ion trap
- With Memosens technology
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps96d)
- Technical Information TI00507C/07/EN

7.2.2 ISFET sensors

Tophit CPS471/CPS471D
- Sterilizable and autoclavable ISFET sensor for food and pharmaceutical industry, process engineering,
- Water treatment and biotechnology;
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps471 or www.products.endress.com/cps471d)
- Technical Information TI00283C/07/EN

Tophit CPS441/CPS441D
- Sterilizable ISFET sensor for media with low conductivity, with
- Liquid KCl electrolyte;
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps441 or www.products.endress.com/cps441d)
- Technical Information TI00352C/07/EN

Tophit CPS491/CPS491D
- ISFET sensor with open aperture for media with high dirt load;
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps491 or www.products.endress.com/cps491d)
- Technical Information TI00377C/07/EN

7.2.3 Oxygen sensors

Oxymax COS22/22D
- ▶ Sterilizable sensor for dissolved oxygen
- ▶ Optionally available with Memosens (COS22D)
- ▶ Order as per product structure (--> Online Configurator, www.products.endress.com/cos22d)
- ▶ Technical Information TI00446C/07/EN

7.2.4 NIR absorption sensor

OUSBT66 (only with optical path length of 10 mm)
- NIR absorption sensor for measuring cell growth and biomass
- CIP/SIP-resistant, autoclavable
- Order as per product structure, www.products.endress.com/ousbt66
- Technical Information TI00469C/07/EN

8 Technical data

8.1 Environment

Ambient temperature

-10 to +70 °C (+ 14 to 158 °F)

Storage temperature

-10 to +70 °C (+ 14 to 158 °F)

8.2 Process

Process temperature range

-10 to +140 °C (14 to 284 °F)

Process pressure

Pneumatic drive	16 bar (232 psi) up to 140 °C (284 °F)
Manual drive	8 bar (116 psi) up to 140 °C (284 °F)

The service life of the seals is reduced if process temperatures are constantly high or if SIP is used. The other process conditions may also reduce the service life of the seals.

Pressure-temperature ratings

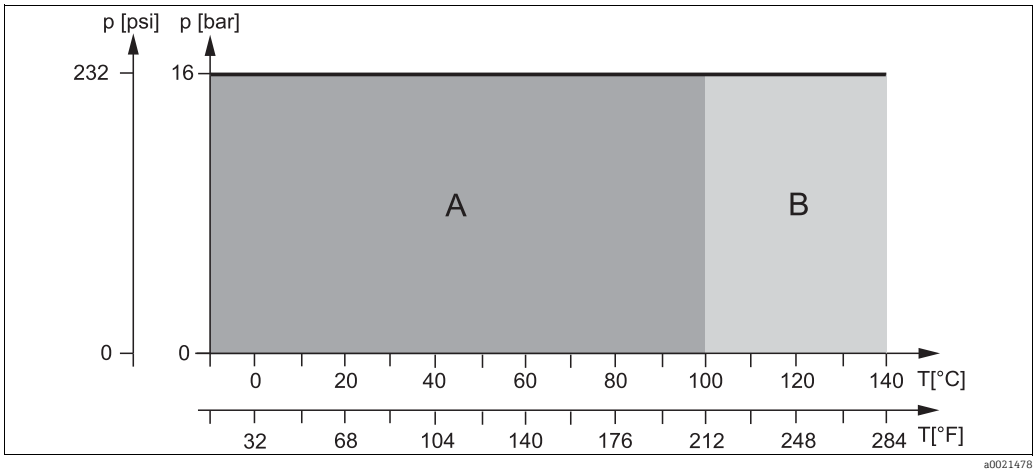


Fig. 35: Pressure-temperature ratings for pneumatic drive

A Dynamic range
B Static range

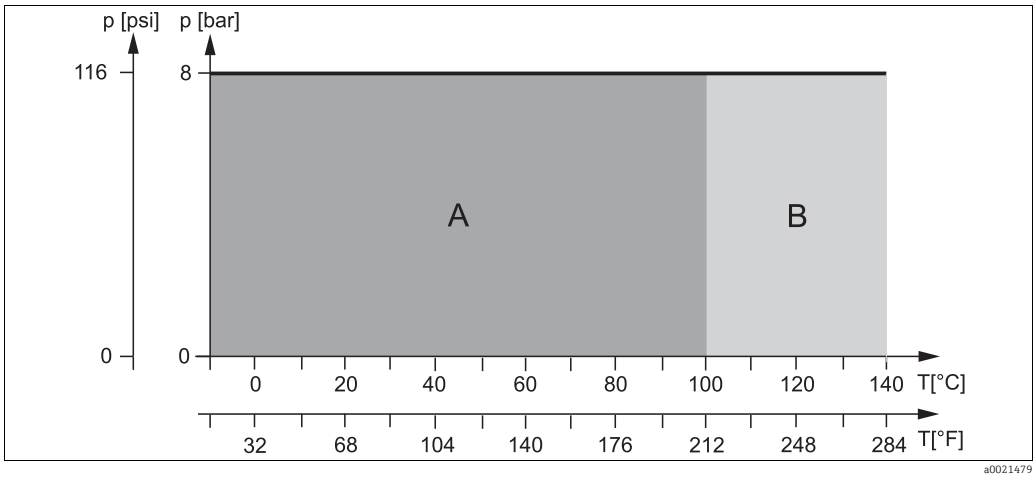


Fig. 36: Pressure-temperature ratings for manual drive

A Dynamic range
B Static range

8.3 Mechanical construction

Design, dimensions

see "Mounting" section

Weight

Depends on version:	
Pneumatic drive:	3.8 to 6 kg (8.4 to 13.2 lbs)
Manual drive:	3 to 4.5 kg (6.6 to 9.9 lbs)

Materials

In contact with medium:	
Seals:	EPDM-FDA (USP Class VI) / FKM-FDA (USP Class VI) / FFKM-FDA (USP Class VI)
Immersion tube:	Stainless steel 1.4435 (AISI 316L) Ra < 0.76 / Ra < 0.38 or Alloy C22 Ra < 0.76
Process connection + service chamber:	Stainless steel 1.4435 (AISI 316L) Ra < 0.76 or Alloy C22 Ra <0.76
Rinse connections:	Stainless steel 1.4435 (AISI 316L)
Not in contact with medium:	
Manual drive:	Stainless steel 1.4301 (AISI 304) or 1.4404 (AISI 316L) Plastics PPS CF15, PBT, PP
Pneumatic drive:	Stainless steel 1.4301 (AISI 304) or 1.4404 (AISI 316L) Plastics PBT, PP

Sensors

Short version	Gel sensors, ISFET	225 mm
	KCl sensors	225 mm
Long version	Gel sensors, ISFET	225 mm
	Gel sensors, ISFET	360 mm
	KCl sensors	360 mm

Limit position switches

Switching element function:	NAMUR NC contact, inductive (permitted for use in hazardous atmospheres)
Switching distance:	1.5 mm (0.06 ")
Nominal voltage:	8 V
Switching frequency:	0 to 5000 Hz
Housing material:	Stainless steel

Index

www.addresses.endress.com

Endress+Hauser

People for Process Automation